WHAT IS CLAIMED IS:

1. A method of detecting polynucleotide analytes using chemiluminescence comprising the steps of:

(a) providing a first film including a complex comprising a polynucleotide analyte bound to a sensitizer or a sensitizer-labeled probe;

(b) providing a second film comprising at least one solid chemiluminescent precursor component immobilized therewith that is capable of producing a triggerable chemiluminescent compound;

(c) placing said first and second films in sufficient proximity to each other to permit singlet oxygen produced from excitation of the sensitizer on said first film and to react with said chemiluminescent precursor on said second film;

(d) exposing said films to suitable conditions to form said triggerable chemiluminescent compound on said second film;

(e) allowing said triggerable chemiluminescent compound to be triggered by an activating source to produce a detectable light signal on said second film; and

(f) detecting and/or recording said resultant signal on said second film.

2. The method of claim 1, wherein said polynucleotide analyte is selected from the group consisting of oligonucleotides, polynucleotides, single-stranded DNA, double-stranded DNA, DNA-RNA duplexes, mRNA, rRNA, tRNA and analogs thereof.

3. The method of claim 1, wherein the sensitizer-labeled probe is complementary in sequence to the polynucleotide analyte.

4. The method of claim 1, wherein the sensitizer is selected from the group consisting of methylene blue, rhodamine, perylene, aromatic hydrocarbons, heterocyclic compounds, eosin, free porphyrins, metalloporphyrins, tetraphenylporphine, phthalocyanine, chlorins, flavin derivatives, xanthines, phenothiazines, acridines, acridans, and combinations thereof.

5. The method of claim 1, wherein said suitable conditions comprises the combination of light and oxygen.

6. The method of claim 1, wherein said chemiluminescent precursor component is an olefin selected from the group consisting of enol ethers, enamines, 9-alkylidene-N-alkylacridans, arylvinylethers, arylimidazoles, 9-alkylidene-xanthenes and lucigenin.

7. The method of claim 6, wherein the chemiluminescent olefin is covalently bound to a fluorescent molecule which further enhances chemical detection.

8. The method of claim 1, wherein said triggerable chemiluminescent compound is a 1,2-dioxetane.

9. The method of claim 1, wherein step (a) comprises incorporating a sensitizer-labeled nucleotide or sensitizer-labeled primer into said polynucleotide analyte or probe.

10. The method of claim 9, wherein said sensitizer-labeled primer is a random or specific primer.

11. The method of claim 9, wherein said sensitizer-labeled nucleotide or primer is incorporated into said polynucleotide analyte or probe during a nucleic acid amplification reaction.

12. The method of claim 11, wherein said nucleic acid amplification reaction is a Polymerase Chain Reaction (PCR) or Nucleic Acid Sequence Based Amplification (NASBA).

13. The method of claim 9, wherein said sensitizer-labeled nucleotide or primer is incorporated into said polynucleotide analyte or probe during a reaction selected from the group consisting of a primer extension reaction, an *in vitro* transcription reaction, a nick translation reaction, and a terminal transferase reaction.

14. The method of claim 1, wherein the sensitizer includes a chemical linker.

15. The method of claim 14, wherein step (a) further comprises reacting said chemical linker with a complementary linking group in the polynucleotide analyte or probe.

16. The method of claim 1, wherein step (a) comprises immobilizing said polynucleotide analyte to said first film.

17. The method of claim 16, wherein step (a) further comprises hybridizing said sensitizer-labeled probe to said immobilized polynucleotide analyte.

18. The method of claim 1, wherein said exposing step further comprises electronically exciting the sensitizer to a triplet state by exposure to one or more of the stimulus selected from the group consisting of radiation, electron transfer, electrolysis, and electroluminescence.

19. The method of claim 18, wherein said radiation comprises light having a wavelength from about 30 nm to about 1,100 nm.

20. The method of claim 18, wherein said exposing step further comprises generating singlet oxygen from the reaction of molecular oxygen with the excited sensitizer.

21. The method of claim 1, wherein said first film is a polymeric film.

22. The method of claim 1, wherein said first film is a glass, metal, textile, paper or cellulose film.

23. The method of claim 1, wherein said activating source is selected from the group consisting of heat, chemical treatment, electrical treatment, enzymatic treatment and combinations thereof.

24. The method of claim 1, further comprising the step of providing a third film for contact with said second film, said third film comprising at least one solid chemical component immobilized on or impregnated therewith which when acted upon by an energy source releases an activating substance, which activating substance in the presence of the triggerable chemiluminescent compound present on said second film, reacts therewith to produce said detectable light signal on the second film.

25. The method of claim 24, wherein the solid chemical component is selected from the group consisting of acids, bases, salts, enzymes, inorganic and organic catalyst, electron donor sources and combinations thereof.

26. The method of claim 24, wherein the energy source is selected from the group consisting of hydration energy, thermal energy, electromagnetic energy, electrical energy, mechanical energy and combinations thereof.

27. The method of claim 25, wherein the enzyme is selected from the group consisting of alkaline phosphatase and horseradish peroxidase.

28. The method of claim 24, wherein the triggerable chemiluminescent compound contains a labile group removable by enzymatic cleavage.

29. A method of preparing a chemiluminescent assay comprising the steps of:

(a) providing a first film including a complex comprising a polynucleotide analyte bound to a sensitizer or a sensitizer-labeled probe;

(b) providing a second film comprising at least one solid chemiluminescent precursor component immobilized therewith that is capable of producing a triggerable chemiluminescent compound;

(c) positioning said first and second films in overlapping contact with each other;

(d) exposing said contacted films to suitable conditions to form the triggerable chemiluminescent compound on the second film; and

(e) allowing said triggerable chemiluminescent compound to be triggered by an activating source to produce a detectable light signal on said second film.

30. The method of claim 29, wherein said polynucleotide analyte is selected from the group consisting of oligonucleotides, polynucleotides, single-stranded DNA, double-stranded DNA, DNA-RNA duplexes, mRNA, rRNA, tRNA and analogs thereof.

31. The method of claim 29, wherein the sensitizer-labeled probe is complementary in sequence to the polynucleotide analyte.

32. The method of claim 29, wherein the sensitizer is selected from the group consisting of methylene blue, rhodamine, perylene, aromatic hydrocarbons, heterocyclic compounds, eosin, free porphyrins, metalloporphyrins, tetraphenylporphine, phthalocyanine, chlorins, flavin derivatives, xanthines, phenothiazines, acridines, acridans, and combinations thereof.

33. The method of claim 29, wherein step (a) comprises incorporating a sensitizer-labeled nucleotide or sensitizer-labeled primer into said polynucleotide analyte or probe.

34. The method of claim 33, wherein said sensitizer-labeled nucleotide or primer is incorporated into said polynucleotide analyte or probe during a nucleic acid amplification reaction.

35. The method of claim 34, wherein said nucleic acid amplification reaction is a Polymerase Chain Reaction (PCR) or Nucleic Acid Sequence Based Amplification (NASBA).

36. The method of claim 33, wherein said sensitizer-labeled nucleotide or primer is incorporated into said polynucleotide analyte or probe during a reaction selected from the group consisting of a primer extension reaction, an *in vitro* transcription reaction, a nick translation reaction, and a terminal transferase reaction.

37. The method of claim 29, wherein the sensitizer includes a chemical linker.

38. The method of claim 37, wherein step (a) further comprises reacting said chemical linker with a complementary linking group in the polynucleotide analyte or probe.

39. The method of claim 29, wherein step (a) comprises immobilizing said polynucleotide analyte to said first film.

40. The method of claim 39, wherein step (a) further comprises hybridizing said sensitizer-labeled probe to said immobilized polynucleotide analyte.

41. The method of claim 29, wherein said exposing step further comprises electronically exciting the sensitizer to a triplet state by exposure to one or more of the stimulus selected from the group consisting of radiation, electron transfer, electrolysis, and electroluminescence.

42. The method of claim 29, wherein said suitable conditions comprises the combination of light and oxygen.

43. The method of claim 29, wherein said chemiluminescent precursor is an olefin selected from the group consisting of enol ethers, enamines, 9-alkylidene-N-alkylacridans, arylvinylethers, arylimidazoles, 9-alkylidene-xanthenes and lucigenin.

44. The method of claim 29, wherein the triggerable chemiluminescent compound is a 1,2-dioxetane.

45. The method of claim 29, wherein the activating source is selected from the group consisting of heat, chemical treatment, electrical treatment, enzymatic treatment and combinations thereof.

46. The method of claim 29, further comprising the step of providing a third film for contact with said second film, said third film comprising at least one solid chemical component immobilized on or impregnated therewith which when acted upon by an energy source releases an activating substance, which activating substance in the presence of the triggerable

chemiluminescent compound present on said second film, reacts therewith to produce said detectable light signal.

47. The method of claim 46, wherein the solid chemical component is selected from the group consisting of acids, bases, salts, enzymes, inorganic and organic catalyst, electron donor sources and combinations thereof.

48. The method of claim 46, wherein the energy source is selected from the group consisting of hydration energy, thermal energy, electromagnetic energy, electrical energy mechanical energy and combinations thereof.

49. A chemiluminescent assay kit comprising:

(a) a first film component comprising a solid film substrate and at least one chemiluminescent precursor immobilized therewith that is capable of producing a triggerable chemiluminescent compound, said film component being free of compounds which generate singlet oxygen and being adapted for use with a sensitizer-labeled polynucleotide analyte or agent probative of the analyte; and (b) a sensitizer-labeled nucleotide and/or a sensitizer-labeled primer.

50. The kit of claim 49, wherein said probative agent is complementary in sequence to the polynucleotide analyte.

51. The kit of claim 49, wherein said primer is a random or specific primer.

52. The kit of claim 49, wherein said nucleotide is a ribonucleotide, a deoxyribonucleotide or a dideoxyribonucleotide.

53. The kit of claim 49, further comprising an activator for triggering a chemiluminescent compound.

54. The kit of claim 53, wherein said activator is immobilized on a second film.

55. The kit of claim 49, wherein said sensitizer-labeled nucleotide is capable of being introduced into said analyte or said probative agent.

56. The kit of claim 49, wherein said sensitizer-labeled primer is capable of being introduced into said analyte or said probative agent.